

CLAIMS

What is claimed is:

1 1. A composition comprising:

2 1) a compound of the formula:



4 2) a compound of the formula:

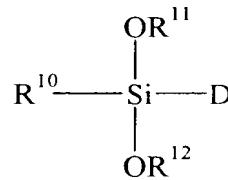


6 3) a crosslinker selected from the group consisting of:

7 a) compounds of the formula:



9 b) compounds of the formula:



14 wherein

15 $R^1, R^2, R^3, R^4, R^5, R^6, R^7, R^8$, and R^9 are independently selected from the group
16 consisting of alkyl groups of from 1 to 4 carbon atoms;

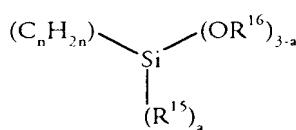
17 E is a monovalent organic group comprising at least one epoxy group;

18 A^1 and A^2 are independently selected from the group consisting of alkyl groups of from
19 1 to 4 carbon atoms and monovalent organic groups comprising at least one epoxy group;

20 u is an integer from 1 to about 2000;

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21 v is an integer from 0 to about 200;
22 the sum of u and v is from 1 to about 2200;
23 G is selected from the group consisting of hydroxy and alkoxy;
24 B¹ and B² are independently selected from the group consisting of alkyl groups of from
25 1 to 4 carbon atoms, hydroxy, and alkoxy;
26 w is an integer from 1 to about 1000;
27 x is an integer from 0 to about 50;
28 the sum of w and x is from 1 to about 1050;
29 Z¹ and Z² are independently selected from the group consisting of hydrogen and alkyl
30 groups of from 1 to 4 carbon atoms;
31 y is from 1 to about 1000;
32 z is from 0 to about 2000;
33 the sum of y and z is from 1 to about 3000;
34 D is selected from the group consisting of hydrogen, substituted or unsubstituted C₁-
35 C₁₂ hydrocarbon moieties, OR¹⁴, and moieties of the formula:



39 R¹⁰ and R¹⁵ are independently selected from the group consisting of hydrogen,
40 substituted or unsubstituted C₁-C₁₂ hydrocarbon moieties, and OR¹³;
41 R¹¹, R¹², R¹³, R¹⁴, and R¹⁶ are independently selected from the group consisting of C₁-
42 C₆ hydrocarbon moieties;

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43 n is 1, 2, or 3; and

44 a is 0, 1, or 2.

1 2. The composition of claim 1 in the form of an aqueous emulsion.

1 3. The composition of claim 2 further comprising a catalyst.

1 4. The composition of claim 2 further comprising at least one surface active agent.

1 5. The composition of claim 3 wherein the catalyst is selected from the group consisting
2 of metal salts of acids, zinc chloride, magnesium chloride, aluminum chloride, metal soaps,
3 non-polymeric anhydrides, and butyl acid phosphate.

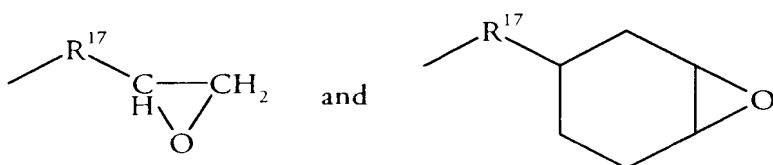
1 6. The composition of claim 4 wherein the surface active agent is selected from the group
2 consisting of non-ionic surface active agents, anionic surface active agents, and cationic
3 surface active agents.

1 7. The composition of claim 1 wherein R¹, R², R³, R⁴, R⁵, R⁶, R⁷, R⁸, and R⁹ are all the
2 same.

1 8. The composition of claim 7 wherein R¹, R², R³, R⁴, R⁵, R⁶, R⁷, R⁸, and R⁹ are all
2 methyl.

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1 9. The composition of claim 1 wherein E is selected from the group consisting of moieties
2 of the structural formulae:



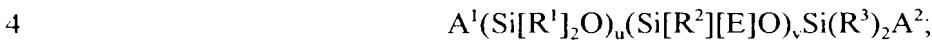
7 wherein R¹⁷ is a divalent substituted or unsubstituted organic group.

1 10. The composition of claim 1 wherein 3)b) is selected from the group consisting of
2 methyltrimethoxysilane, methyltriethoxysilane, ethyltriethoxysilane,
3 methylpentamethoxydisilyl methane, tetraethoxysilane, cyclohexyltriethoxysilane and
4 methyltripropoxysilane.

1 11. A process of treating textiles comprising the steps of:

2 A) providing an aqueous emulsion comprising a composition comprising:

3 1) a compound of the formula:

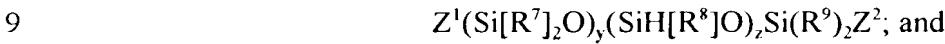


5 2) a compound of the formula:

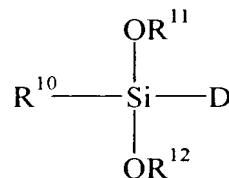


7 3) a crosslinker selected from the group consisting of:

8 a) compounds of the formula:



10 b) compounds of the formula:



15 wherein

16 R¹, R², R³, R⁴, R⁵, R⁶, R⁷, R⁸, and R⁹ are independently selected from the group
17 consisting of alkyl groups of from 1 to 4 carbon atoms;

E is a monovalent organic group comprising at least one epoxy group;

19 A¹ and A² are independently selected from the group consisting of alkyl groups
20 of from 1 to 4 carbon atoms and monovalent organic groups comprising at least one epoxy
21 group;

22 u is an integer from 1 to about 2000;

23 v is an integer from 0 to about 200;

24 the sum of u and v is from 1 to about 2200;

25 G is selected from the group consisting of hydroxy and alkoxy;

26 B¹ and B² are independently selected from the group consisting of alkyl groups
27 of from 1 to 4 carbon atoms, hydroxy, and alkoxy;

28 w is an integer from 1 to about 1000;

29 x is an integer from 0 to about 50;

30 the sum of w and x is from 1 to about 1050;

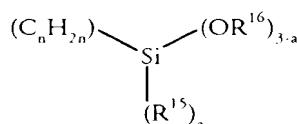
31 Z¹ and Z² are independently selected from the group consisting of hydrogen
32 and alkyl groups of from 1 to 4 carbon atoms;

33 y is from 1 to about 1000;

34 z is from 0 to about 2000;

35 the sum of y and z is from 1 to about 3000;

36 D is selected from the group consisting of hydrogen, substituted or
37 unsubstituted C₁-C₁₂ hydrocarbon moieties, OR¹⁴, and moieties of the formula:



41 R¹⁰ and R¹⁵ are independently selected from the group consisting of hydrogen,
42 substituted or unsubstituted C₁-C₁₂ hydrocarbon moieties, and OR¹³,

43 R¹¹, R¹², R¹³, R¹⁴, and R¹⁶ are independently selected from the group consisting
44 of C₁-C₆ hydrocarbon moieties;

45 n is 1, 2, or 3; and

46 a is 0, 1, or 2.

47 B) providing a catalyst suitable to the aqueous emulsion that will promote a
48 condensation reaction between compounds 1), 2), and 3);

49 C) mixing the aqueous emulsion and the catalyst to form a mixture;

50 D) applying the mixture to the textile; and

51 E) heat treating the textile to form a condensation reaction product of compounds
52 of 1), 2), and 3);

53 whereby the textile has enhanced durability, water repellency, and softness.

1 12. The process of claims 11 further comprising the step of removing an excess of the
2 aqueous emulsion from the textile.

1 13. The process of claim 11 wherein the aqueous emulsion further comprises at least one
2 surface active agent.

1 14. The process of claim 11 wherein the catalyst is selected from the group consisting of
2 metal salts of acids, zinc chloride, magnesium chloride, aluminum chloride, metal soaps, non-
3 polymeric anhydrides, and butyl acid phosphate.

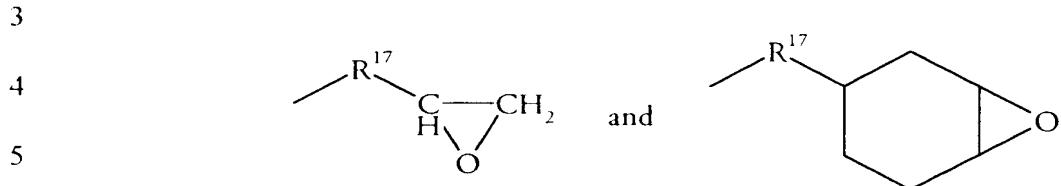
1 15. The process of claim 13 wherein the surface active agent is selected from the group
2 consisting of non-ionic surface active agents, anionic surface active agents, and cationic
3 surface active agents.

1 16. The process of claim 11 wherein R¹, R², R³, R⁴, R⁵, R⁶, R⁷, R⁸, and R⁹ are all the same.

1 17. The process of claim 16 wherein R¹, R², R³, R⁴, R⁵, R⁶, R⁷, R⁸, and R⁹ are all methyl.

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1 18. The process of claim 11 wherein E is selected from the group consisting of moieties of
2 the structural formulae:



7 wherein R¹⁷ is a divalent substituted or unsubstituted organic group.

1 19. The process of claim 11 wherein 3)b) is selected from the group consisting of
2 methyltrimethoxysilane, methyltriethoxysilane, ethyltriethoxysilane,
3 methylpentamethoxydisilylethane, tetraethoxysilane, cyclohexyltriethoxysilane and
4 methyltripropoxysilane.